# OCTOPLOID POPULATIONS OF OENOTHERA FRUTICOSA L. (ONAGRACEAE) FROM COASTAL NORTH CAROLINA[1]

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In 1818 Thomas Nuttall named *Oenothera riparia* from particularly robust specimens of a day-flowering *Oenothera* he had collected three years before on the banks of the Cape Fear River, near Wilmington, North Carolina (Nuttall, 1818). Since then a very few collections have been made of similar populations from coastal North and South Carolina, including the following representative material: North Carolina, New Hanover County, Wilmington, *Coville 189* (US), and *Biltmore Herb. 14944* (NY, US); South Carolina, Charleston County, Blake Marsh, *Alexander 53* (US).

*Oenothera riparia* has been variously treated in manuals since Nuttall named the species. Torrey and Gray (1840), Chapman (1860), and Pennell (1919) followed Nuttall in considering it a distinct species. Small (1933), in his Manual of the Southeastern Flora considered it a distinct species, although he had earlier (Small, 1896) considered it synonymous with *Kneiffia linearis* (Michx.) Spach (= *O. fruticosa* L.). Munz (1937, 1965) placed it as a subspecies of the variable *O. tetragona* Roth (= *O. fruticosa* ssp. *glauca* (Michx.) Straley). More recently, it has not been given taxonomic status, but rather considered a variant of the polymorphic *O. fruticosa* ssp. *fruticosa* (Radford et al., 1964; Straley, 1977). In a monograph of *Oenothera* sect. *Kneiffia,* I pointed out the characteristics of these populations and called for a cytological investigation of them (Straley, 1977, p. 400). At that time no recent herbarium specimens could be located, nor were any typical "*riparia*" populations found in the field during the study, although some populations with intermediate morphological characteristics between these robust forms and more typical *O. fruticosa* were collected. However, it was later learned that C. Ritchie Bell knew of "*riparia*" populations and in August 1979 David E. Boufford visited

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these localities. Boufford collected two populations of robust plants; along the NE Cape Fear River, Cowpen Landing, Pender County, North Carolina, *Boufford et al. 21575* (CM, MO), and 0.8 km S of Pender County line on Hwy. 421, New Hanover County, North Carolina, *Boufford et al. 21576* (CM, MO). Both populations were growing along the edges of the river and partially submerged in the river. Plants from these populations were grown at Missouri Botanical Garden, where they have been examined cytologically by Steven R. Seavey and Warren L. Wagner. Both populations were determined to be octoploids ($n = 28$). Meiotic associations were variable, with bivalents, and chains and/or rings of up to eight chromosomes, as in octoploid populations of *O. pilosella* Raf. These are the first octoploid numbers reported for *O. fruticosa,* which is predominately tetraploid, with a few hexaploid popultions. As far as is known hexaploid populations are restricted to coastal areas, with a few in the Piedmont, from Virginia to northern Florida. Tetraploids are generally distributed throughout the range of the species, from Canada to northern Florida and west to Oklahoma. Furthermore, hexaploids are apparently restricted to the southern and lowland subspecies *fruticosa,* while the more northern and higher elevation subspecies *glauca* is strictly tetraploid. Chromosome numbers are known for no other coastal North Carolina populations, and for only one population, a hexaploid, from coastal South Carolina. The nearest known tetraploids to these octoploids are in coastal Virginia (Sussex, Prince George, and Dinwiddie counties), the Piedmont of North Carolina (Mecklenbergy County), and coastal Georgia (Jenkins and Tatnall counties).

The octoploid populations and similar populations of robust plants for which no chromosome numbers are known seem to be restricted to very wet situations on the Coast, often at least partially submerged. Some of the hexaploid populations not only exhibit intermediate morphological characters between the octoploids and the smaller tetraploids, but also grow in intermediate environmental conditions. They are often found in the edges of sluggish streams, as in a collection growing in the edge of the North Landing River, Virginia Beach, Virginia, *Straley 701* (MO, VPI). Typical *Oenothera fruticosa* from coastal areas is in more upland situations, often in sandy, well-drained soils.

Morphologically, the octoploid populations differ from most other coastal *Oenothera fruticosa* ssp. *fruticosa* in that the octoploids are more robust, are much more branched, and generally more leafy throughout. Plants are less pubescent and the leaves are more succulent than most of the plants from drier habitats. Adventitious roots are prominent on the lower portion of the stems of progeny raised in cultivation, but were not apparent in nature, at least not on the voucher specimens collected. In size, plants are more like high elevation ssp. *glauca* populations, but the narrower leaves, non-glandular pubescence and shape of the capsules allows these robust plants to be placed readily with ssp. *fruticosa.*

The discovery of these octoploids indicates a need for further detailed cytological analysis of *Oenothera fruticosa* populations in coastal southeastern United States to determine the extent of octoploids and hexaploids and to detemine if there is any correlation between ploidy level and morphological characters or the semi-aquatic habitat. The octoploids must have arisen directly from tetraploids, but do the tetraploid populations still exist along the Coast?

Pending further investigation, I still see no benefit gained in giving taxonomic recognition to the hexaploid or octoploid populations, but rather recognizing them as a part of a highly variable species, morphologically, chromosomally, and in its habitat preference.

## LITERATURE CITED

CHAPMAN, A. W. 1860. Flora of the Southern United States. Ivison, Phinney, & Co., New York.

MUNZ, P. A. 1937. Studies in the Onagraceae. X. The subgenus *Kneiffia* (genus *Oenothera*) and miscellaneous new species of *Oenothera*. Bull. Torrey Bot. Club **64**: 287–306.

————. 1965. Onagraceae. N. Amer. Fl., ser. 2, **5**: 1–278. New York Botanical Garden, New York.

NUTTALL, T. 1818. The Genera of North American Plants and a Catalogue of the Species, to the Year 1817. Philadelphia.

PENNELL, F. W. 1919. A brief conspectus of the species of *Kneiffia* with the characterization of a new allied genus. Bull. Torrey Bot. Club **46**: 363–373.

RADFORD, A. E., H. E. AHLES, & C. R. BELL. 1968. Manual of the Vascular Flora of the Carolinas. Univ. of North Carolina Press, Chapel Hill.

SMALL, J. K. 1896. *Oenothera* and its segregates. Bull. Borrey Bot. Club **23**: 167–194.

————. 1933. Manual of the Southeastern Flora. New York.

STRALEY, G. B. 1977. Systematics of *Oenothera* sect. *Kneiffia* (Onagraceae). Ann. Missouri Bot. Gard. **64**: 381–424.

TORREY, J. & A. GRAY. 1838–1840. Flora of North America. Wiley & Putnam, New York.